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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
FLETCHER III, WILLIAM P	

ART UNIT	PAPER NUMBER
1762	

DATE MAILED: 07/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/747,731	YAMAZAKI ET AL.
	Examiner	Art Unit
	William P. Fletcher III	1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 May 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *20-22,37-40,43-45,48,49 and 53-101* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *20-22,37-40,43-45,48,49 and 53-~~56~~* 101 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 May 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *09 May 2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Receipt is acknowledged of applicant's amendment and response, filed 09 May 2005. To clarify the record at this point in the prosecution, claims 20-22, 37-40, 43-45, 48, 49, and 53-101 are pending.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 09 May 2005 was filed after the mailing date of the first Office action after RCE on 07 January 2005. The required fee under 37 CFR 1.17(p) has been charged per applicant's authorization, thereby complying with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Response to Arguments

3. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection, necessitated by applicant's amendment, set-forth below.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. **Claims 20–22, 44, 45, 48, 63, 70, and 74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arai et al. (US 5,817,366 A) in view of Grothe et al. (US 3,391,490 A), Monk (US 4,187,801 A), and Nagayama et al. (US 5,701,055 A).**

With respect to claims 20 and 48, Arai teaches a method of manufacturing a display device in a cluster tool [abstract; c. 2, ll. 31 – 35; and c. 3, ll. 10 – 15]. Each processing chamber, of which there are at least two, has an evaporation source for the deposition of a material, which may be an organic electroluminescence material, on the substrate [c. 3, l. 66 – c. 5, l. 55]. As the substrate is transferred between chambers, layers of different EL materials are successively applied to produce the display device [c. 4, ll. 34 – 51 and c. 9, ll. 1 – 20]. Arai does not place any limitations on the layer deposition processes carried-out in the chambers.

Arai does not teach that: (i) fixing a mask to the substrate wherein the mask is located between the substrate and the first evaporation source; (ii) the first and second evaporation sources have a first direction longer than a second direction or that the relative positions of the sources; or (iii) the substrates are repeatedly moved during deposition so that a same portion of the substrate is coated with the organic EL material at least twice.

With respect to (i), Nagayama teaches a process for forming an electroluminescent device by vapor deposition of the various layers that includes fixing a shadow mask between the substrate and a deposition source in order to form the desired patterned structures on the substrate (8:42-62). It would have been obvious to one of ordinary skill in the art to modify the process of Arai so as to utilize a shadow mask in the claimed fashion. One of ordinary skill in

the art would have been motivated to do so by the desire and expectation of successfully forming the desired patterns of organic electroluminescent material on the substrate.

With respect to (ii), Grothe teaches that, when coating a substrate by vapor deposition, an evaporation source elongated in one dimension results in enhanced vapor density and deposition uniformity over the entire width of the substrate [c. 5, ll. 40 – 50 and 60 – 63]. It is the examiner's position that the source of Grothe reads on applicant's source. It would have been obvious to one of ordinary skill in the art to modify the process of Arai so as to utilize, as the evaporation source, the evaporation source of Grothe. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of achieving enhanced vapor density and deposition uniformity, as taught by Grothe.

With respect to (iii), Monk teaches that, in a process where a substrate is coated from an evaporation source, it is known to move the substrate and the evaporation source relative to each other [c. 1, ll. 9 – 21]. Doing so yields a uniform coating [c. 1, l. 15]. It would have been obvious to one of ordinary skill in the art to further modify the process of Arai so as to move the substrate and the evaporation sources relative to each other, as taught by Monk. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of yielding a uniform coating.

Lastly, it is well-known in the art of coating substrates to repeat a coating step the number of times required to build-up a coating of a desired thickness. Consequently, it would have been obvious to one of ordinary skill in the art to do so.

With respect to claim 21, none of the cited references teach cleaning the inside of the deposition chambers. It is the examiner's position, however, that cleaning the inside of a

deposition chamber is a well-known means of eliminating contaminants in the chamber. Consequently, it would have been obvious to one of ordinary skill in the art to do so.

With respect to claim 22, the transfer vacuum chamber **1** of Arai reads on a "conveyor chamber."

With respect to claims 44 and 45, it would have been obvious, to one of ordinary skill in the art, to optimize the orientation of the source with respect to the direction of motion so as to achieve the greatest efficiency and uniformity of coating. In particular, an orientation in which the direction of elongation of the source is perpendicular to the direction of motion allows coating the widest swath of substrate possible with each pass of the coating source.

With respect to claim 63, it is the examiner's position that the shape and distribution of the film thickness is a physical characteristic inherently arising from shape and arrangement of the evaporation source. Since this combination of references otherwise teaches all of applicant's other method limitations — including the shape and arrangement of the evaporation source(s) — it is the examiner's position that the deposited film inherently possesses the characteristics recited in this claim.

With respect to new claim 70, it is the examiner's position that the cluster tool arrangement, with its multiple coating chambers separated via a transfer chamber, reads on applicant's claimed "chambers connected with each other through at least one gate."

With respect to claim 74, none of the cited references explicitly states that the evaporation sources has a length exceeding 300 mm along the first direction. It is the examiner's position that, especially in view of the teaching of Grothe, it would have been obvious to one of ordinary skill in the art to select the elongated dimension of the source commensurate with the

width of area to be covered. In other words, the length of the elongated dimension of the source is a result-effective variable effecting the degree of coverage and length of time of the overall coating process. The greater the area covered, the shorter the coating process. Consequently, it would have been obvious to one of ordinary skill in the art to optimize the length of the elongated dimension of the coating source by routine experimentation, absent evidence of criticality. See MPEP 2144.05.

7. **Claims 37, 43, 48, 53, 64, and 75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arai et al. (US 5,817,366 A), in view of Bennett (US 2,435,997 A), Grothe et al. (US 3,931,490 A), and Nagayama et al. (US 5,701,055 A).**

The teaching of Arai is detailed above. Arai does not place any limitations on the vapor deposition processes carried-out in the chambers.

Arai does not teach: (i) fixing a mask to the substrate wherein the mask is located between the substrate and the first evaporation source; (ii) that the first and second evaporation sources have a first direction longer than a second direction; or (iii) that the relative positions of the sources and the substrates are repeatedly moved during deposition so that a same portion of the substrate is coated with the organic EL material at least twice.

With respect to (i), Nagayama teaches a process for forming an electroluminescent device by vapor deposition of the various layers that includes fixing a shadow mask between the substrate and a deposition source in order to form the desired patterned structures on the substrate (8:42-62). It would have been obvious to one of ordinary skill in the art to modify the process of Arai so as to utilize a shadow mask in the claimed fashion. One of ordinary skill in

the art would have been motivated to do so by the desire and expectation of successfully forming the desired patters of organic electroluminescent material on the substrate.

With respect to (ii), Grothe teaches that, when coating a substrate by vapor deposition, an evaporation source elongated in one dimension results in enhanced vapor density and deposition uniformity over the entire width of the substrate [c. 5, ll. 40 – 50 and 60 – 63]. It is the examiner's position that the source of Grothe reads on applicant's source. It would have been obvious to one of ordinary skill in the art to modify the process of Arai so as to utilize, as the evaporation source, the evaporation source of Grothe. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of achieving enhanced vapor density and deposition uniformity, as taught by Grothe.

With respect to (iii), Bennett teaches that, in a vacuum vapor deposition process, moving the evaporation source with respect to the substrate improves deposition speed and uniformity [c. 3, ll. 1 – 10]. It would have been further obvious to one of ordinary skill in the art to modify the method of Arai so as to move the evaporation source relative to the substrate, as taught by Bennett. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of improving deposition speed and uniformity.

None of the cited references teach coating the same portion of the substrate twice. It is, nevertheless, well-known in the art of coating substrates to repeat a coating step the number of times required to build-up a coating of a desired thickness. Consequently, it would have been obvious to one of ordinary skill in the art to do so.

It would have been further obvious, to one of ordinary skill in the art, to optimize the orientation of the source with respect to the direction of motion so as to achieve the greatest

efficiency and uniformity of coating. In particular, an orientation in which the direction of elongation of the source is perpendicular to the direction of motion allows coating the widest swath of substrate possible with each pass of the coating source.

With respect to claim 53, none of the cited references teach coating the same portion of the substrate twice. It is, nevertheless, well-known in the art of coating substrates to repeat a coating step the number of times required to build-up a coating of a desired thickness. Consequently, it would have been obvious to one of ordinary skill in the art to do so.

With respect to claim 64, it is the examiner's position that the shape and distribution of the film thickness is a physical characteristic inherently arising from shape and arrangement of the evaporation source. Since this combination of references otherwise teaches all of applicant's other method limitations — including the shape and arrangement of the evaporation source(s) — it is the examiner's position that the deposited film inherently possesses the characteristics recited in this claim.

With respect to new claim 75, none of the cited references explicitly states that the evaporation sources has a length exceeding 300 mm along the first direction. It is the examiner's position that, especially in view of the teaching of Grothe, it would have been obvious to one of ordinary skill in the art to select the elongated dimension of the source commensurate with the width of area to be covered. In other words, the length of the elongated dimension of the source is a result-effective variable effecting the degree of coverage and length of time of the overall coating process. The greater the area covered, the shorter the coating process. Consequently, it would have been obvious to one of ordinary skill in the art to optimize the length of the

elongated dimension of the coating source by routine experimentation, absent evidence of criticality. See MPEP 2144.05.

8. **Claims 38, 48, 56, 65, and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arai et al. (US 5,817,366 A), in view of Bennett (US 2,435,997 A), Grothe et al. (US 3,931,490 A), Nagayama et al. (US 5,701,055 A), and Monk (US 4,187,801 A).**

The combined teaching of Arai, Bennett, Grothe, and Nagayama is detailed above. None of the references teach that the evaporation sources are longer than at least one edge of the substrate.

Monk teaches that, in a vapor deposition method, it is conventional to treat a larger area than covered by the substrate to avoid edge effects [c. 1, ll. 17 – 20].

Consequently, it would have been obvious to one of ordinary skill in the art to modify the method of Arai, Bennett, and Grothe, so as to utilize an elongated source that is longer than at least one edge of the substrate. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of avoiding edge effects, as suggested by Monk.

None of the cited references teach coating the same portion of the substrate twice. It is, nevertheless, well-known in the art of coating substrates to repeat a coating step the number of times required to build-up a coating of a desired thickness. Consequently, it would have been obvious to one of ordinary skill in the art to do so.

It would have been further obvious, to one of ordinary skill in the art, to optimize the orientation of the source with respect to the direction of motion so as to achieve the greatest efficiency and uniformity of coating. In particular, an orientation in which the direction of

elongation of the source is perpendicular to the direction of motion allows coating the widest swath of substrate possible with each pass of the coating source.

With respect to claim 53, none of the cited references teach coating the same portion of the substrate twice. It is, nevertheless, well-known in the art of coating substrates to repeat a coating step the number of times required to build-up a coating of a desired thickness. Consequently, it would have been obvious to one of ordinary skill in the art to do so.

With respect to claim 65, it is the examiner's position that the shape and distribution of the film thickness is a physical characteristic inherently arising from shape and arrangement of the evaporation source. Since this combination of references otherwise teaches all of applicant's other method limitations — including the shape and arrangement of the evaporation source(s) — it is the examiner's position that the deposited film inherently possesses the characteristics recited in this claim.

With respect to new claim 76, none of the cited references explicitly states that the evaporation sources has a length exceeding 300 mm along the first direction. It is the examiner's position that, especially in view of the teaching of Grothe, it would have been obvious to one of ordinary skill in the art to select the elongated dimension of the source commensurate with the width of area to be covered. In other words, the length of the elongated dimension of the source is a result-effective variable effecting the degree of coverage and length of time of the overall coating process. The greater the area covered, the shorter the coating process. Consequently, it would have been obvious to one of ordinary skill in the art to optimize the length of the elongated dimension of the coating source by routine experimentation, absent evidence of criticality. See MPEP 2144.05.

9. **Claim 39, 48, 53, 57, 66, and 77 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Arai et al. (US 5,817,366 A), in view of Nagayama et al. (US 5,701,055 A), Feuerstein et al. (US 4,627,989 A), Bennett (US 2,435,997 A), and Yamamoto et al. (JP 11-61386 A, US 6,179,923 B1 provided as English-language equivalent).**

The teaching of Arai is detailed above. Arai does not place any limitations on the vapor deposition processes carried-out in the chambers.

Arai does not teach fixing a mask to the substrate wherein the mask is located between the substrate and the first evaporation source.

Nagayama teaches a process for forming an electroluminescent device by vapor deposition of the various layers that includes fixing a shadow mask between the substrate and a deposition source in order to form the desired patterned structures on the substrate (8:42-62). It would have been obvious to one of ordinary skill in the art to modify the process of Arai so as to utilize a shadow mask in the claimed fashion. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of successfully forming the desired patterns of organic electroluminescent material on the substrate.

Arai does not teach that first and second evaporation sources comprise a plurality of evaporation cells arranged along a first direction or that the relative positions of the sources are repeatedly moved with respect to the substrate during deposition so that a same portion of the substrate is coated at least twice.

Feuerstein teaches a method of coating a substrate utilizing a vacuum evaporator comprising an elongated array of individually controllable vapor sources [c. 1, ll. 21 - 24; c. 2, ll.

40 - 45; c. 4, ll. 55 - 57; and c. 6, ll. 18 - 26]. Such a source facilitates greater control over deposition thickness and uniformity [c. 2, ll. 41 - 45].

It would have been obvious to one of ordinary skill in the art to modify the process of Arai so as to utilize an evaporation source comprising a plurality of evaporation cells arranged along a first direction so as to achieve greater control over deposition thickness and uniformity, as suggested by Feuerstein.

It would have been further obvious to move the relative position of this source with respect to the substrate during evaporation. Bennett teaches that moving the source with respect to the substrate improves deposition speed and uniformity [see above]. Specifically moving the source instead of the substrate is considered advantageous because it requires a smaller vacuum chamber [c. 3, l. 72 - c. 4, l. 3].

None of the cited references teach coating the same portion of substrate twice. It is, nevertheless, well-known in the art of coating substrates to repeat a coating step the number of times required to build-up a coating of a desired thickness. Consequently, it would have been obvious to do so.

It would have been obvious to one of ordinary skill in the art to optimize the orientation of the source with respect to the direction of motion so as to achieve the greatest efficiency and uniformity of coating. In particular, an orientation in which the direction of elongation of the source is perpendicular to the direction of motion allows coating the widest swath of substrate possible with each pass of the coating source.

Lastly, none of the cited references teach applicant's newly-added limitation requiring "cleaning an inside of the evaporation chamber." Yamamoto teaches that, in the vapor

deposition of organic thin films for EL devices, it is conventional to clean the parts equipped in each chamber and the inside wall of the chambers after every deposition on the substrate (2:23-27). Doing so prevents contamination of the substrate by residual organic material having a tendency to peel-off of the chamber surfaces (2:63-3:8). Consequently, it would have been obvious to one of ordinary skill in the art to modify the method of Arai, Feuerstein, and Bennett so as to perform the conventional step of cleaning the deposition chamber. One of ordinary skill would have been motivated to do so by the desire and expectation of preventing contamination of the substrate.

The examiner notes that the body of Yamamoto's disclosure is directed to a method in which an additional set of cleaned parts is provided in each chamber, thereby eliminating the need to clean after each step, thereby saving time (5:45-8:30). Consequently, in the alternative, it would have been obvious to one of ordinary skill in the art to modify the method of Arai, Feuerstein, and Bennett so as to provide an additional set of cleaned parts to eliminate the need for repeated cleaning. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of reducing the processing time. The parts still need to be cleaned at some point, either before, during, or after the deposition process. Consequently, Yamamoto's invention also reads on applicant's claimed "cleaning an inside of the evaporation chamber."

With respect to claim 53, none of the cited references teach coating the same portion of substrate twice. It is, nevertheless, well-known in the art of coating substrates to repeat a coating step the number of times required to build-up a coating of a desired thickness. Consequently, it would have been obvious to do so.

With respect to claim 66, it is the examiner's position that the shape and distribution of the film thickness is a physical characteristic inherently arising from shape and arrangement of the evaporation source. Since this combination of references otherwise teaches all of applicant's other method limitations — including the shape and arrangement of the evaporation source(s) — it is the examiner's position that the deposited film inherently possesses the characteristics recited in this claim.

With respect to new claim 77, none of the cited references explicitly states that the evaporation sources has a length exceeding 300 mm along the first direction. It is the examiner's position that, especially in view of the teaching of Grothe, it would have been obvious to one of ordinary skill in the art to select the elongated dimension of the source commensurate with the width of area to be covered. In other words, the length of the elongated dimension of the source is a result-effective variable effecting the degree of coverage and length of time of the overall coating process. The greater the area covered, the shorter the coating process. Consequently, it would have been obvious to one of ordinary skill in the art to optimize the length of the elongated dimension of the coating source by routine experimentation, absent evidence of criticality. See MPEP 2144.05.

10. **Claim 40, 48, 58, 67, and 78 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Arai et al. (US 5,817,366 A), in view of Nagayama et al. (US 5,701,055 A), Feuerstein et al. (US 4,627,989 A), Bennett (US 2,435,997 A), and Yamamoto et al. (JP 11-61386 A, US 6,179,923 B1 provided as English-language equivalent) or, in the alternative, over Arai et al., in view of Nagayama et al. (US 5,701,055 A), Feuerstein et al.,**

Bennett, Monk (US 4,187,801 A), and Yamamoto et al. (JP 11-61386 A, US 6,179,923 B1 provided as English-language equivalent).

The combined teaching of Arai, Nagayama, Feuerstein, and Bennett is detailed above. Additionally, Feuerstein illustrates, but does not require, a source that is longer than at least one edge of the substrate [Fig. 1]. Nevertheless, it would have been obvious to utilize a source longer than at least one edge of the substrate to avoid edge effects, as taught by Monk [see above].

It would have been further obvious to move the relative position of this source with respect to the substrate during evaporation. Bennett teaches that moving the source with respect to the substrate improves deposition speed and uniformity [see above]. Specifically moving the source instead of the substrate is considered advantageous because it requires a smaller vacuum chamber [c. 3, l. 72 - c. 4, l. 3].

None of the cited references teach coating the same portion of substrate twice. It is, nevertheless, well-known in the art of coating substrates to repeat a coating step the number of times required to build-up a coating of a desired thickness. Consequently, it would have been obvious to do so.

It would have been obvious to one of ordinary skill in the art to optimize the orientation of the source with respect to the direction of motion so as to achieve the greatest efficiency and uniformity of coating. In particular, an orientation in which the direction of elongation of the source is perpendicular to the direction of motion allows coating the widest swath of substrate possible with each pass of the coating source.

Lastly, none of the cited references teach applicant's newly-added limitation requiring "cleaning an inside of the evaporation chamber." Yamamoto teaches that, in the vapor deposition of organic thin films for EL devices, it is conventional to clean the parts equipped in each chamber and the inside wall of the chambers after every deposition on the substrate (2:23-27). Doing so prevents contamination of the substrate by residual organic material having a tendency to peel-off of the chamber surfaces (2:63-3:8). Consequently, it would have been obvious to one of ordinary skill in the art to modify the method of Arai, Feuerstein, and Bennett so as to perform the conventional step of cleaning the deposition chamber. One of ordinary skill would have been motivated to do so by the desire and expectation of preventing contamination of the substrate.

The examiner notes that the body of Yamamoto's disclosure is directed to a method in which an additional set of cleaned parts is provided in each chamber, thereby eliminating the need to clean after each step, thereby saving time (5:45-8:30). Consequently, in the alternative, it would have been obvious to one of ordinary skill in the art to modify the method of Arai, Feuerstein, and Bennett so as to provide an additional set of cleaned parts to eliminate the need for repeated cleaning. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of reducing the processing time. The parts still need to be cleaned at some point, either before, during, or after the deposition process. Consequently, Yamamoto's invention also reads on applicant's claimed "cleaning an inside of the evaporation chamber."

With respect to claim 67, it is the examiner's position that the shape and distribution of the film thickness is a physical characteristic inherently arising from shape and arrangement of the evaporation source. Since this combination of references otherwise teaches all of applicant's

other method limitations — including the shape and arrangement of the evaporation source(s) — it is the examiner's position that the deposited film inherently possesses the characteristics recited in this claim.

With respect to new claim 78, none of the cited references explicitly states that the evaporation sources has a length exceeding 300 mm along the first direction. It is the examiner's position that, especially in view of the teaching of Grothe, it would have been obvious to one of ordinary skill in the art to select the elongated dimension of the source commensurate with the width of area to be covered. In other words, the length of the elongated dimension of the source is a result-effective variable effecting the degree of coverage and length of time of the overall coating process. The greater the area covered, the shorter the coating process. Consequently, it would have been obvious to one of ordinary skill in the art to optimize the length of the elongated dimension of the coating source by routine experimentation, absent evidence of criticality. See MPEP 2144.05.

11. **Claim 49 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Arai et al. (US 5,817,366 A) in view of Grothe et al. (US 3,391,490 A), Monk (US 4,187,801 A), and Nagayama et al. (US 5,701,055 A) as applied to claim 20 above, further in view of Spitzer et al. (US 5,258,325 A).**

The teachings of all of the cited references are described above. None of these teach that the display device is an active matrix electroluminescence display device.

Spitzer et al. teach that it is the electrode arrangement that distinguishes an active matrix device. Consequently, it is the examiner's position that it would have been obvious to utilize the above-cited methods of depositing organic electroluminescent material to manufacture an active

matrix electroluminescent display device. One of ordinary skill in the art would have been motivated by the expectation of successfully manufacturing an active matrix EL display device since the deposition of the organic EL material does not determine whether or not the matrix is active.

12. **Claims 54, 68, 71, and 79 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arai et al. (US 5,817,366 A), in view of Nagayama et al. (US 5,701,055 A), Bennett (US 2,435,997 A), Grothe et al. (US 3,931,490 A), and Yamamoto et al. (JP 11-61386 A, US 6,179,923 B1 provided as English-language equivalent).**

The teaching of Arai is detailed in paragraph 8 above. Arai does not place any limitations on the vapor deposition processes carried-out in the chambers.

Arai does not teach fixing a mask to the substrate wherein the mask is located between the substrate and the first evaporation source.

Nagayama teaches a process for forming an electroluminescent device by vapor deposition of the various layers that includes fixing a shadow mask between the substrate and a deposition source in order to form the desired patterned structures on the substrate (8:42-62). It would have been obvious to one of ordinary skill in the art to modify the process of Arai so as to utilize a shadow mask in the claimed fashion. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of successfully forming the desired patterns of organic electroluminescent material on the substrate.

Arai does not teach that the first and second evaporation sources have a first direction longer than a second direction or that the relative positions of the sources and the substrates are

repeatedly moved during deposition so that a same portion of the substrate is coated with the organic EL material at least twice.

Grothe teaches that, when coating a substrate by vapor deposition, an evaporation source elongated in one dimension results in enhanced vapor density and deposition uniformity over the entire width of the substrate [c. 5, ll. 40 – 50 and 60 – 63]. It is the examiner's position that the source of Grothe reads on applicant's source.

It would have been obvious to one of ordinary skill in the art to modify the process of Arai so as to utilize, as the evaporation source, the evaporation source of Grothe. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of achieving enhanced vapor density and deposition uniformity, as taught by Grothe.

Bennett teaches that, in a vacuum vapor deposition process, moving the evaporation source with respect to the substrate improves deposition speed and uniformity [c. 3, ll. 1 – 10].

It would have been further obvious to one of ordinary skill in the art to modify the method of Arai so as to move the evaporation source relative to the substrate, as taught by Bennett. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of improving deposition speed and uniformity.

None of the cited references teach coating the same portion of the substrate twice. It is, nevertheless, well-known in the art of coating substrates to repeat a coating step the number of times required to build-up a coating of a desired thickness. Consequently, it would have been obvious to one of ordinary skill in the art to do so.

It would have been further obvious, to one of ordinary skill in the art, to optimize the orientation of the source with respect to the direction of motion so as to achieve the greatest efficiency and

uniformity of coating. In particular, an orientation in which the direction of elongation of the source is perpendicular to the direction of motion allows coating the widest swath of substrate possible with each pass of the coating source.

Lastly, none of the cited references teach applicant's newly-added limitation requiring "cleaning an inside of the evaporation chamber." Yamamoto teaches that, in the vapor deposition of organic thin films for EL devices, it is conventional to clean the parts equipped in each chamber and the inside wall of the chambers after every deposition on the substrate (2:23-27). Doing so prevents contamination of the substrate by residual organic material having a tendency to peel-off of the chamber surfaces (2:63-3:8). Consequently, it would have been obvious to one of ordinary skill in the art to modify the method of Arai, Feuerstein, and Bennett so as to perform the conventional step of cleaning the deposition chamber. One of ordinary skill would have been motivated to do so by the desire and expectation of preventing contamination of the substrate.

The examiner notes that the body of Yamamoto's disclosure is directed to a method in which an additional set of cleaned parts is provided in each chamber, thereby eliminating the need to clean after each step, thereby saving time (5:45-8:30). Consequently, in the alternative, it would have been obvious to one of ordinary skill in the art to modify the method of Arai, Feuerstein, and Bennett so as to provide an additional set of cleaned parts to eliminate the need for repeated cleaning. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of reducing the processing time. The parts still need to be cleaned at some point, either before, during, or after the deposition process. Consequently, Yamamoto's invention also reads on applicant's claimed "cleaning an inside of the evaporation chamber."

With respect to claim 68, it is the examiner's position that the shape and distribution of the film thickness is a physical characteristic inherently arising from shape and arrangement of the evaporation source. Since this combination of references otherwise teaches all of applicant's other method limitations — including the shape and arrangement of the evaporation source(s) — it is the examiner's position that the deposited film inherently possesses the characteristics recited in this claim.

With respect to new claim 79, none of the cited references explicitly states that the evaporation sources has a length exceeding 300 mm along the first direction. It is the examiner's position that, especially in view of the teaching of Grothe, it would have been obvious to one of ordinary skill in the art to select the elongated dimension of the source commensurate with the width of area to be covered. In other words, the length of the elongated dimension of the source is a result-effective variable effecting the degree of coverage and length of time of the overall coating process. The greater the area covered, the shorter the coating process. Consequently, it would have been obvious to one of ordinary skill in the art to optimize the length of the elongated dimension of the coating source by routine experimentation, absent evidence of criticality. See MPEP 2144.05.

13. **Claims 55, 69, 72, and 80 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arai et al. (US 5,817,366 A), in view of Nagayama et al. (US 5,701,055 A), Bennett (US 2,435,997 A), Grothe et al. (US 3,931,490 A), Monk (US 4,187,801 A), and Yamamoto et al. (JP 11-61386 A, US 6,179,923 B1 provided as English-language equivalent).**

The combined teaching of Arai, Nagayama, Bennett, and Grothe is detailed above. None of the references teach that the evaporation sources are longer than at least one edge of the substrate.

Monk teaches that, in a vapor deposition method, it is conventional to treat a larger area than covered by the substrate to avoid edge effects [c. 1, ll. 17 – 20].

Consequently, it would have been obvious to one of ordinary skill in the art to modify the method of Arai, Nagayama, Bennett, and Grothe, so as to utilize an elongated source that is longer than at least one edge of the substrate. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of avoiding edge effects, as suggested by Monk.

None of the cited references teach coating the same portion of the substrate twice. It is, nevertheless, well-known in the art of coating substrates to repeat a coating step the number of times required to build-up a coating of a desired thickness. Consequently, it would have been obvious to one of ordinary skill in the art to do so.

It would have been further obvious, to one of ordinary skill in the art, to optimize the orientation of the source with respect to the direction of motion so as to achieve the greatest efficiency and uniformity of coating. In particular, an orientation in which the direction of elongation of the source is perpendicular to the direction of motion allows coating the widest swath of substrate possible with each pass of the coating source..

The combined teaching of Arai, Bennett, and Grothe is detailed above. None of the references teach that the evaporation sources are longer than at least one edge of the substrate.

Monk teaches that, in a vapor deposition method, it is conventional to treat a larger area than covered by the substrate to avoid edge effects [c. 1, ll. 17 – 20].

Consequently, it would have been obvious to one of ordinary skill in the art to modify the method of Arai, Bennett, and Grothe, so as to utilize an elongated source that is longer than at least one edge of the substrate. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of avoiding edge effects, as suggested by Monk.

None of the cited references teach coating the same portion of the substrate twice. It is, nevertheless, well-known in the art of coating substrates to repeat a coating step the number of times required to build-up a coating of a desired thickness. Consequently, it would have been obvious to one of ordinary skill in the art to do so.

It would have been further obvious, to one of ordinary skill in the art, to optimize the orientation of the source with respect to the direction of motion so as to achieve the greatest efficiency and uniformity of coating. In particular, an orientation in which the direction of elongation of the source is perpendicular to the direction of motion allows coating the widest swath of substrate possible with each pass of the coating source.

Lastly, none of the cited references teach applicant's newly-added limitation requiring "cleaning an inside of the evaporation chamber." Yamamoto teaches that, in the vapor deposition of organic thin films for EL devices, it is conventional to clean the parts equipped in each chamber and the inside wall of the chambers after every deposition on the substrate (2:23-27). Doing so prevents contamination of the substrate by residual organic material having a tendency to peel-off of the chamber surfaces (2:63-3:8). Consequently, it would have been obvious to one of ordinary skill in the art to modify the method of Arai, Feuerstein, and Bennett so as to perform the conventional step of cleaning the deposition chamber. One of ordinary skill

would have been motivated to do so by the desire and expectation of preventing contamination of the substrate.

The examiner notes that the body of Yamamoto's disclosure is directed to a method in which an additional set of cleaned parts is provided in each chamber, thereby eliminating the need to clean after each step, thereby saving time (5:45-8:30). Consequently, in the alternative, it would have been obvious to one of ordinary skill in the art to modify the method of Arai, Feuerstein, and Bennett so as to provide an additional set of cleaned parts to eliminate the need for repeated cleaning. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of reducing the processing time. The parts still need to be cleaned at some point, either before, during, or after the deposition process. Consequently, Yamamoto's invention also reads on applicant's claimed "cleaning an inside of the evaporation chamber."

With respect to claim 69, it is the examiner's position that the shape and distribution of the film thickness is a physical characteristic inherently arising from shape and arrangement of the evaporation source. Since this combination of references otherwise teaches all of applicant's other method limitations — including the shape and arrangement of the evaporation source(s) — it is the examiner's position that the deposited film inherently possesses the characteristics recited in this claim.

With respect to new claim 80, none of the cited references explicitly states that the evaporation sources has a length exceeding 300 mm along the first direction. It is the examiner's position that, especially in view of the teaching of Grothe, it would have been obvious to one of ordinary skill in the art to select the elongated dimension of the source commensurate with the width of area to be covered. In other words, the length of the elongated dimension of the source

is a result-effective variable effecting the degree of coverage and length of time of the overall coating process. The greater the area covered, the shorter the coating process. Consequently, it would have been obvious to one of ordinary skill in the art to optimize the length of the elongated dimension of the coating source by routine experimentation, absent evidence of criticality. See MPEP 2144.05.

14. **Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arai et al. (US 5,817,366 A), in view of Nagayama et al. (US 5,701,055 A), Bennett (US 2,435,997 A) and Grothe et al. (US 3,931,490 A), as applied to claim 37 above, further in view of Spitzer et al. (US 5,258,325 A).**

The teachings of all of the cited references are described above. None of these teach that the display device is an active matrix electroluminescence display device.

Spitzer et al. teach that it is the electrode arrangement that distinguishes an active matrix device. Consequently, it is the examiner's position that it would have been obvious to utilize the above-cited methods of depositing organic electroluminescent material to manufacture an active matrix electroluminescent display device. One of ordinary skill in the art would have been motivated by the expectation of successfully manufacturing an active matrix EL display device since the deposition of the organic EL material does not determine whether or not the matrix is active.

15. **Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arai et al. (US 5,817,366 A), in view of Nagayama et al. (US 5,701,055 A), Bennett (US 2,435,997 A), Grothe et al. (US 3,931,490 A), and Monk (US 4,187,801 A), as applied to claim 38 above, further in view of Spitzer et al. (US 5,258,325 A).**

The teachings of all of the cited references are described above. None of these teach that the display device is an active matrix electroluminescence display device.

Spitzer et al. teach that it is the electrode arrangement that distinguishes an active matrix device. Consequently, it is the examiner's position that it would have been obvious to utilize the above-cited methods of depositing organic electroluminescent material to manufacture an active matrix electroluminescent display device. One of ordinary skill in the art would have been motivated by the expectation of successfully manufacturing an active matrix EL display device since the deposition of the organic EL material does not determine whether or not the matrix is active.

16. **Claim 61 rejected under 35 U.S.C. § 103(a) as being unpatentable over Arai et al. (US 5,817,366 A), in view of Nagayama et al. (US 5071,055 A), Feuerstein et al. (US 4,627,989 A), Bennett (US 2,435,997 A), and Yamamoto et al. (JP 11-61386 A, US 6,179,923 B1 provided as English-language equivalent), as applied to claim 39 above, further in view of Spitzer et al. (US 5,258,325 A).**

The teachings of all of the cited references are described above. None of these teach that the display device is an active matrix electroluminescence display device.

Spitzer et al. teach that it is the electrode arrangement that distinguishes an active matrix device. Consequently, it is the examiner's position that it would have been obvious to utilize the above-cited methods of depositing organic electroluminescent material to manufacture an active matrix electroluminescent display device. One of ordinary skill in the art would have been motivated by the expectation of successfully manufacturing an active matrix EL display device

since the deposition of the organic EL material does not determine whether or not the matrix is active.

17. **Claim 62 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Arai et al. (US 5,817,366 A), in view of Nagayama et al. (US 5,701,055 A), Feuerstein et al. (US 4,627,989 A), Bennett (US 2,435,997 A), and Yamamoto et al. (JP 11-61386 A, US 6,179,923 B1 provided as English-language equivalent) or, in the alternative, over Arai et al., in view of Nagayama et al., Feuerstein et al., Bennett, Monk (US 4,187,801 A), and Yamamoto et al. (JP 11-61386 A, US 6,179,923 B1 provided as English-language equivalent), as applied to claim 40 above, further in view of Spitzer et al. (US 5,258,325 A).**

The teachings of all of the cited references are described above. None of these teach that the display device is an active matrix electroluminescence display device.

Spitzer et al. teach that it is the electrode arrangement that distinguishes an active matrix device. Consequently, it is the examiner's position that it would have been obvious to utilize the above-cited methods of depositing organic electroluminescent material to manufacture an active matrix electroluminescent display device. One of ordinary skill in the art would have been motivated by the expectation of successfully manufacturing an active matrix EL display device since the deposition of the organic EL material does not determine whether or not the matrix is active.

18. **Claim 73 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arai et al. (US 5,817,366 A) in view of Grothe et al. (US 3,391,490 A), Monk (US 4,187,801 A), and Nagayama et al. (US 5,701,055 A), as applied to claim 20 above, further in view of Mizutani et al. (US 6,326,726 B1).**

The combined teaching of Arai in view of Grothe, Monk, and Nagayama is detailed above.

None of the cited references teaches that the mask is fixed to the substrate by a magnet field.

Mizutani teaches a process of forming an electroluminescent device by vapor deposition of various organic layers through a shadow mask. The shadow mask is attached to the substrate utilizing an electromagnet (5:65-6:6). Doing so fits the mask securely against the substrate, facilitating the formation of a fine and accurate pattern (6:1-6).

It would have been obvious to one of ordinary skill in the art to modify the process of Arai in view of Grothe, Monk, and Nagayama so as to attach the mask to the substrate utilizing an electromagnet. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of facilitating the formation of a fine and accurate pattern.

19. **Claims 81-88 and 92-100 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arai et al. (US 5,817,366 A) in view of Grothe et al. (US 3,391,490 A), Monk (US 4,187,801 A), and Nagayama et al. (US 5,701,055 A).**

The combined teaching of Arai in view of Grothe, Monk, and Nagayama is detailed above.

While Arai is silent with respect to precise nature of the organic EL layers deposited by the vapor process, Nagayama teaches forming a hole injecting layer and a light emitting layer over the hole injecting layer by a vapor deposition process (6:43-51 and 8:56-60). Nagayama further teaches that the structure includes a conducting film over the light emitting layer and a sealing layer over the light emitting layer.

Since Arai is non-limiting as to the precise nature of the organic EL layers deposited, it would have been obvious to one of ordinary skill in the art to modify the process so as to deposit the claimed structure since Nagayama teaches such a vapor-deposited structure is suitable for EL devices. Further, with respect to claim 85, it would have been obvious to one of ordinary skill in the art to seal the structure without exposure to the atmosphere (i.e., in the coating apparatus) so as to (i) prevent attack by moisture, and (ii) simplify the process by not removing the unsealed structure from the apparatus for additional treatment.

With respect to claims 84, 88, 94, 97, and 100, none of the cited references explicitly states that the evaporation sources has a length exceeding 300 mm along the first direction. It is the examiner's position that, especially in view of the teaching of Grothe, it would have been obvious to one of ordinary skill in the art to select the elongated dimension of the source commensurate with the width of area to be covered. In other words, the length of the elongated dimension of the source is a result-effective variable effecting the degree of coverage and length of time of the overall coating process. The greater the area covered, the shorter the coating process. Consequently, it would have been obvious to one of ordinary skill in the art to optimize the length of the elongated dimension of the coating source by routine experimentation, absent evidence of criticality. See MPEP 2144.05.

20. **Claims 89-91 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arai et al. (US 5,817,366 A) in view of Grothe et al. (US 3,391,490 A), Monk (US 4,187,801 A), and Nagayama et al. (US 5,701,055 A).**

The combined teaching of Arai in view of Grothe, Monk, and Nagayama is detailed above.

Arai does not teach moving the mask by one pixel portion increments between deposition of materials.

Again, Nakayama teaches a process for the vapor deposition of organic EL layers through a shadow mask in which the mask is moved by one pixel portion increments between deposition of various EL organic layers (Fig. 8).

Since Arai is non-limiting as to the precise nature of the organic EL layer vapor deposition , it would have been obvious to one of ordinary skill in the art to modify the process so as to deposit in the claimed fashion since Nagayama teaches such a vapor-deposited structure is suitable for EL devices.

With respect to claim 91, none of the cited references explicitly states that the evaporation sources has a length exceeding 300 mm along the first direction. It is the examiner's position that, especially in view of the teaching of Grothe, it would have been obvious to one of ordinary skill in the art to select the elongated dimension of the source commensurate with the width of area to be covered. In other words, the length of the elongated dimension of the source is a result-effective variable effecting the degree of coverage and length of time of the overall coating process. The greater the area covered, the shorter the coating process. Consequently, it would have been obvious to one of ordinary skill in the art to optimize the length of the elongated dimension of the coating source by routine experimentation, absent evidence of criticality. See MPEP 2144.05.

21. **Claim 101 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arai et al. (US 5,817,366 A) in view of Grothe et al. (US 3,391,490 A), Monk (US 4,187,801 A), and**

Nagayama et al. (US 5,701,055 A), as applied to claim 98 above, further in view of Spitzer et al. (US 5,258,325 A).

The teachings of all of the cited references are described above. None of these teach that the display device is an active matrix electroluminescence display device.

Spitzer et al. teach that it is the electrode arrangement that distinguishes an active matrix device. Consequently, it is the examiner's position that it would have been obvious to utilize the above-cited methods of depositing organic electroluminescent material to manufacture an active matrix electroluminescent display device. One of ordinary skill in the art would have been motivated by the expectation of successfully manufacturing an active matrix EL display device since the deposition of the organic EL material does not determine whether or not the matrix is active.

Conclusion

22. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William P. Fletcher III whose telephone number is (571) 272-1419. The examiner can normally be reached on Monday through Friday, 9 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy H. Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

WPF 7/21/2005
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Patent Examiner, USPTO
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TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER